

## **HAZARD IDENTIFICATION AND RISK MANAGEMENT**

### **Introduction**

Today we find that despite every effort by one and all, the accident rate is not reducing below a certain limit. This necessitates more initiative to be taken so as to minimize the loss of manpower, equipment, and property. This will ultimately lead to reduction in accident and improved equipment condition, thus channeling of more and more resources towards more improved method of working by enhancing the skill and environment which is more conducive to better health hygiene and thus improve morale of the work force and making them more creative at work. This will naturally result in enhanced productivity on a sustained basis. In this chapter, an attempt has been made towards hazard identification and risk assessment with regards to the incident leading towards losses and to prioritize the action for either eliminating the hazard or minimizing the effect of it.

‘Hazard’ has been defined as a source of potential harm to people, property or the environment. Alternatively, hazard is an agent (either chemical, biological, or physical) or it is a set of conditions that presents a source of risk. In any given situation hazards are fixed, they can vary in two ways-their intrinsic nature (e.g. high pressure/low pressure) and their scale (more or a less).

### **Risk Assessment**

Risk analysis involves the identification and quantification of the various hazards (unsafe conditions) that exist in the plant. On the other hand, risk analysis deals with the identification and quantification of risks. The workers are exposed to accident occur in the plant area. Risk analysis follows an extensive hazard analysis. It involves the identification of hazards and assessment of risks the workers and neighboring populations are exposed to. This requires a thorough knowledge of failure probability, maximum credible accident scenario, vulnerability of population etc. Consequently, the risk analysis is often confined to maximum credible accident studies. Based on the risk estimation for fuel and chemical storage On-site management Plan and Disaster Management Plan (DMP) has been prepared.

### **Approaches to the Study**

Risk involves the occurrence or potential occurrence of some accidents consisting of an event or sequence of events. The risk assessment study covers the following:

- Identification of potential hazard areas.
- Identification of representative failure cases.
- Visualization of the resulting scenarios in terms of fire (thermal radiation) and explosion.

- Assess the overall damage potential of the identified hazardous events and the impact zones from the accidental scenarios.
- Assess the overall suitability of the site for hazard minimization and disaster mitigation points of view.
- Furnish specific recommendations on the minimization of the worst accident possibilities
- Preparation of broad On-site and Off-site Emergency Plan, which includes Occupational and Health Safety Plan.

### **Hazard Identification & Risk Assessment (HIRA)**

#### **Hazard with production of Low carbon Ferrochromium**

The major Hazard with respect to the manufacturing of Low carbon ferrochromium is Low fire risk. Ferro-chromium contains about 70 to 75% chromium. Fine-sized chromium metal when suspended in air can be ignited, will propagate flame readily, and will generate some pressure or a mild explosion. Fine-Sized ferrochromium alloys when suspended in air could be ignited would weekly propagate flame but could not be exploded. Lump chromium metal and ferrochromium alloys are not combustible. No hazard associated with skin contact. It is recommended that;

- Its loading should be done under dry weather conditions only and keep as dry as reasonably practicable.
- Remove dust area to fresh air and use NIOSH approved schedule 21C respirators in dusty areas.
- Flush with water to ensure no particles remain in the eye and protective gloves are recommended during handling, lump material may have sharp edges; as with other metal dust, avoid contamination of work clothing.

#### **Low carbon ferromanganese**

The major Hazard with respect to the manufacturing of Low carbon ferromanganese is moderately fire risk. Ferro manganese contains 70 to 75% manganese. Negligible fire and explosion hazard in bulk form. Dust/air mixtures may ignite or explode. Avoid generating dust; fine dust dispersed in air in sufficient concentrations, and in the presence of an ignition source is a potential dust explosion hazard. Contact with water or moist air may release flammable gases. It is recommended that;

- Its loading should be done under dry weather conditions only and keep as dry as reasonably practicable.
- Wear full protective fire-fighting gear including self-contained breathing apparatus (SCBA) for protection against possible exposure. Wash thoroughly after handling. Avoid release to the environment.

- Do not allow contact with water. Handle under inert gas. Protect from moisture. Do not breathe dust or mist. Do not eat, drink or smoke when using this product.
- Obtain special instructions before use. Do not handle until all safety precautions have been read and understood.

### **Ferro molybdenum**

The major Hazard with respect to the manufacturing of ferromolybdenum is negligible fire risk. Ferro molybdenum contains 60 to 65% molybdenum. Negligible fire and explosion hazard in bulk form. Dust/air mixtures may ignite or explode. Move container from fire area if it can be done without risk. Cool containers with water spray until well after the fire is out. Use extinguishing agents appropriate for surrounding fire. Avoid inhalation of material or combustion by-products. It is recommended that

- Its loading should be done under dry weather conditions only and keep as dry as reasonably practicable.
- Wear appropriate chemical resistant gloves.
- Obtain special instructions before use. Do not handle until all safety precautions have been read and understood.

### **Ferro vanadium**

The major Hazard with respect to the manufacturing of ferro vanadium is negligible fire risk. Ferro vanadium contains 60 to 65% vanadium. Negligible fire and explosion hazard in bulk form. Dust/air mixtures may ignite or explode. Move container from fire area if it can be done without risk. Cool containers with water spray until well after the fire is out. Use extinguishing agents appropriate for surrounding fire. Avoid inhalation of material or combustion by-products. It is recommended that

- Material should be kept dry and in closed containers. Keep away from sparks, heat, open flame, and combustible materials. Store in a well-ventilated area.
- Avoid procedures that cause dusting. Keep away from sparks, heat, and open flame. Chunks may have razor-sharp edges.
- Wear appropriate chemical resistant gloves.

### **Safety Plan**

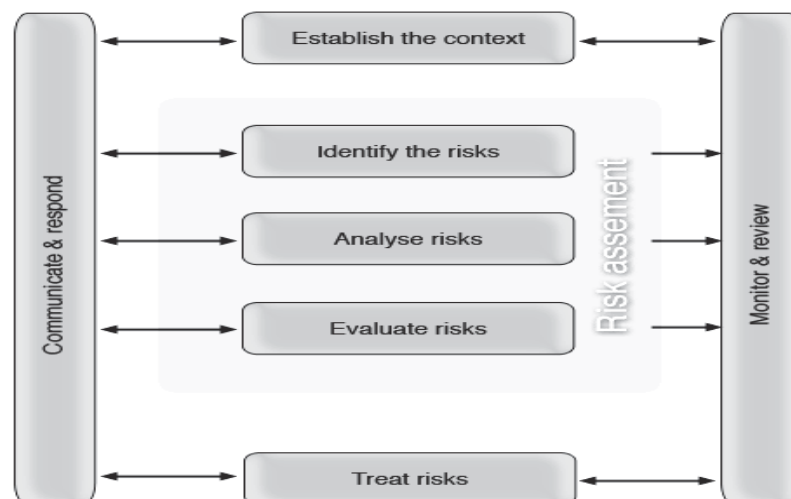
Safety of both men and materials during construction and operation phases is of prime concern. The preparedness of an industry for the occurrence of possible disasters is known as emergency plan. Possibility of disaster in the proposed plant is due to leakage of fuels, chemical hazard, collapse of structures and fire/explosion etc. Keeping in view the safety requirement during construction, operation and maintenance phases, and the plant shall formulate safety policy with the following regulations:

1. To allocate sufficient resources to maintain safe and healthy conditions in working environment.

2. To ensure that all known safety factors are taken into account in the design, construction, operation and maintenance of plants, machine all equipment.
3. To ensure that adequate safety instructions are given to all employees.
4. To provide wherever necessary protective equipment, safety appliances and clothing and to ensure their proper use
5. To inform employees about materials, equipment or processes used in their work, which are known to be potentially hazardous to health/safety.
6. To keep all operations and methods of work under regular review for making necessary changes from the point of view of safety in the light of experience and up to date knowledge.
7. To provide appropriate facilities for first aid and prompt treatment of injuries and illness at work.
8. To provide appropriate instruction, training and supervision to employees in health and safety, first aid and to ensure that adequate publicity is given to these matters.
9. To ensure proper implementation of fire prevention methods and an appropriate fire-fighting service together with training facilities for personnel involved in this service.
10. To organize collection, analysis and presentation of data on accident, sickness and incident involving personal injury or injury to health with a view of taking corrective, remedial and preventive action.
11. To publish/notify regulations, instructions and notices in the local language of employees.
12. To prepare separate safety rules for each type of occupation/processes involved in the project.

## RISK ASSESSMENT

Risk assessment is the determination of quantitative and qualitative value of risk related to a concrete situation and a recognized threat. Activities requiring assessment of risk due to occurrence of most probable instances of hazard and accident are both onsite and off-site.



The risk management measures for the proposed project activities will be adopted as required for best safety practice within the works boundary. In addition, the design and engineering of the proposed activities will take into consideration of the proposed protection measures towards maintaining environmental norms.

### 5 x 5 Matrix for Risk Assessment

#### Likelihood

5. Almost Certain
4. Probable
3. Possible
2. Possible (under unfortunate circumstances)
1. Rare

#### Severity

5. Fatality
4. Major Injury, resulting in disability
3. Injury Requires, Doctor's or Hospital attendance
2. Minor Injury, 1st Aid required
1. Minor Injury, 1st Aid not required

#### Risk Rating

Risk Rating is calculated by multiplying the likelihood against the consequences, e.g. taking a likelihood of 4, which is classified as Probable, and multiplying this against a consequence of 2, which is classified as a Minor Injury 1st aid required, would give you an overall risk rating of 8, which would be risk rated as a low risk.



High Risk (16 – 25)	High Risks activities should cease immediately until further control measures to mitigate the risk are introduced
Medium Risk (9 – 15)	Medium Risks should only be tolerated for the short-term and then only whilst further control measures to mitigate the risk are being planned and introduced, within a defined time period.  Note: Medium risks can be an organizations greatest risk, its Achilles heel, this due to the fact that they can be tolerated in the short-term.
Low Risk (1 – 8)	Low Risks are largely acceptable, subject to reviews periodically, or after significant change etc.

**Table: Site Specific HIRA of M/s JCPL**

S. No.	Operation process Equipment /areas	Possible Hazardous	Precautionary measures	Measures to be taken if any hazard occurs
1.	Electrical Panel	Electrical Shock possible due to short-circuit.	Earth leakage circuit breaker is installed.	In an event of electric leakage main supply should be immediately shut off.
2.	Furnaces	Fire hazards caused by flames	1. Emergency kit is kept readily available in store and working place. 2. Fire-fighting equipment powder/Foam type extinguishers are kept readily available. 3. Hydrant system provided at conspicuous place. 4. Fire-fighting trained man is employed. 5. Periodic inspection done to avoid accident of any kind.	Fire Extinguisher & Hydrant at suitable location
3.	Electrical transformer	Electrical power	Shock proof insulated PCC Platform.	Immediate Cut off the power supply, treat the injured for electrical shock
		Fire 1	Firefighting equipment: (i) Sand buckets. (ii) Fire extinguisher.	Immediately fight fire with available resources, summon outside help if necessary.
4.	Diesel Oil/ Transformer Oil etc. storage.	Fire hazard may be possible if directly comes in contact.	Fire proof system made available and fighting equipment like Foam, extinguishers and hydrant system, etc., are kept	Proper care is to be taken while storing and keeping the oil drums.
5.	Chemicals Storage area	In case of bottle breakage, causes burns and damage to respirator systems due to	1. Proper care should be taken while handling the chemicals. 2. First Aid Box should be available at Site with all necessary and required medicines. 3. Firefighting equipment like	Instruction Boards to be displaced for knowledge of other workers to take care of the situation in the event of occurrence.

S. No.	Operation process Equipment /areas	Possible Hazardous	Precautionary measures	Measures to be taken if any hazard occurs
		inhalation	Extinguishers, sand buckets should be available always.	

## MITIGATION MEASURES

Risk Mitigation measures for the proposed Expansion and new Installation activities require adoption of best safety practice at the respective construction zones as well as operational phase within the works boundary. In addition, the design and engineering of the proposed facilities will take into consideration of the proposed protection measures for air and water environmental as outlined in earlier Chapter.

### Electrical safety

- Adequately rated and quick response circuit breakers, aided by reliable and selective digital or microprocessor based electromagnetic protective relays would be incorporated in the electrical system design for the proposed activities.
- The metering and instruments would be of proper accuracy class and scale dimensions.

### Fire Fighting Facilities

### Fire Fighting Facilities

All the fire extinguisher system will be controlled by the Security Department. Safety department will consist of qualified safety manager, safety officer and supporting staff.

- Portable fire extinguishers
- Fire Hydrant system
- Sprinkler system employed near fire prone areas
- Fire Buckets

### Personal Protective Equipment (PPE)

Personal Protective equipment kept onsite are made readily available to plant personnel.

**Table** shows the lists of recommended Personal Protective equipment (PPE) onsite.

**Table: Summary of Recommended Personal Protective Equipment according to Hazard**

	Workplace Hazards	Suggested PPE
Eye and face protection	Flying particles, molten metal, gases or vapors, light radiation	Safety glasses with side-shields, protective shades, etc.
Head protection	Falling objects, inadequate height clearance, and overhead power cords	Plastic helmets for top and side impact protection
Hearing protection	Noisy Areas	Hearing protectors (ear plugs or ear muffs)
Foot	Falling or rolling objects, points	Safety shoes and boots for protection

	<b>Workplace Hazards</b>	<b>Suggested PPE</b>
protection	objects. Corrosive or hot liquids	against moving and falling objects, liquids and chemicals
Hand protection	Hazardous materials, cuts or lacerations, vibrations, extreme temperatures	Gloves made of rubber or synthetic material (Neoprene), leather, steel, insulation materials, etc.
Respiratory protection	Dust, fogs, fumes, mists, gases, smokes, vapors	<ul style="list-style-type: none"> <li>• Facemasks with appropriate filters for dust removal and air purification (chemical, mists, vapors and gases).</li> <li>• Single or multi-gas personal monitors, if available</li> </ul>
	Oxygen deficiency	Portable or supplied air (fixed lines). Onsite rescue equipment
Body / leg protection	Extreme temperatures, hazardous materials, biological agents, cutting and laceration	Insulating clothing, body suits, aprons etc. of appropriate materials

**Occupational Health & Safety onsite as per TOR Point (8i-iv):**

**(i) Details of existing Occupational & Safety Hazards.** What are the exposure levels of above mentioned hazards and whether they are within Permissible Exposure level (PEL). If these are not within PEL, what measures the company has adopted to keep them within PEL so that health of the workers can be preserved,

**Occupational Health Hazards at M/s. Jamshedpur Chlorochem Pvt. Ltd., Jharkhand**

M/s. JCPL will adopt suitable measures for the proper occupational health safety of workers complying with OSHA standards.

- Dust Exposure level of shop floor workers shall be appropriately monitored.
- Check of the effectiveness of preventive and control measures on regular basis.
- Adequate supplies of potable drinking water is to be provided. Water supplied to areas of Plant food preparation or for the purpose of personal hygiene (washing or bathing) are according to drinking water quality standards
- Where there is potential for exposure to harmful dusts by ingestion arrangements are to be made for clean eating areas, where workers are not exposed to the hazardous or noxious substances
- Periodic medical hearing checks are to be performed on workers exposed to high noise levels
- Provisions are to be made to provide OHS orientation training to all new employees to ensure they are apprised of the basic site rules of work at / on the site and of personal protection and preventing injury to fellow employees



- Contractors that have the technical capability to manage the occupational health and safety issues of their employees are to be hired, extending the application of the hazard management activities through formal procurement agreements
- Ambulances and First aid treatment facilities are made available for any emergency situation

**(ii) Details of exposure specific health status evaluation of worker. If the workers' health is being evaluated by pre designed format, chest X rays, Audiometry, Spirometry. Vision testing (Far & Near vision. color vision and any other ocular defect) ECG, during pre-placement and periodical examinations give the details of the same. Details regarding last month analyzed data of abovementioned parameters as per age, sex, duration of exposure and department wise.**

Workers' health shall be evaluated by pre designed format, given below for chest x rays, Audiometry, Spirometry, Vision testing (Far & Near vision. color vision and any other ocular defect) ECG, during pre- placement and periodical examinations that will give the details of the same.

<b>Spirometry Tests</b>						
<b>Year</b>	<b>Total Manpower</b>	<b>FVC (litres)</b>	<b>FEV 1</b>	<b>FEV 1/ FVC %</b>	<b>PEFR</b>	<b>Conclusion</b>

<b>Physical Examination Tests</b>								
<b>YEAR</b>	<b>Total Manpower</b>	<b>Pulse</b>	<b>ECG</b>	<b>BP</b>	<b>Right Eye</b>	<b>Left Eye</b>	<b>Color Blindness</b>	<b>Squint</b>

<b>Investigations Tests</b>					
<b>YEAR</b>	<b>Total Manpower</b>	<b>Blood ( CBC)</b>	<b>Blood Sugar (F&amp; PP)</b>	<b>Lipid profile</b>	<b>URINE ( R&amp;M )</b>

<b>Audiometry Tests</b>					
<b>YEAR</b>	<b>Total Manpower</b>	<b>Audiometry done</b>	<b>Normal</b>	<b>Abnormal</b>	<b>Conclusion</b>

**(iii) Annual report of health status of workers with special reference to Occupational Health and Safety.**

Annual report of health will be reviewed for M/s. Jharkhand Ispat Pvt Ltd, manpower once the facility the proposed activity is. Operational as per above given formats.

**iv) Plan and fund allocation to ensure the occupational health & safety of all contract and casual workers.**

Necessary required budgetary allocation will be kept for to ensure safety of all Employees including contract & casual workers

## **DISASTER MANAGEMENT PLAN**

### **Introduction to the term “Disaster”**

The term “Disaster” refer to extensive damage of property and serious disruption both inside, outside the work system and its surrounding that can be natural or human interfered. Emergency may be caused by a number of different factors, e.g. plant failure it will normally manifest itself in three basic forms viz fire, explosion or toxic release and requires the assistance of emergency control services to handle mass devastation effectively.

### **Need of Disaster Management**

Disaster Management Plan for an Industrial unit is necessarily a combination of various actions, which are to be taken in a very short time but in a pre-set sequence to deal effectively and efficiently with any disaster emergency, major accident with an aim to keep the loss of human life, material, plant/machinery etc. to the minimum. Creation and establishment of a cell within the Industrial unit is a perquisite for an effective implementation of any disaster management plan.

The aim of Disaster management plan is concerned with preventing accidents through following guidelines of good design practice, operation, maintenance and inspection, by which it is possible to reduce the risk of an accident. Since it is known to all it is not possible to eliminate entire risk since, absolute safety is not achievable.

After Assessing and quantifying the possible scenarios, consequence analysis approach to emergency preparedness and emergency planning delineates Disaster Management Plan for both on-site and off-site. These plans are needed to be implemented in the event of a disaster.

The main functions of the Disaster Management Cell are to prepare a detailed disaster management plan, which includes:

- Identification of various types of expected disasters that may arise in low carbon ferro-alloy type of the industrial unit;
- Identification of various groups, agencies, departments etc. necessary for dealing with a specific disaster effectively;
- Preparation - by intensive training - of relevant teams/groups within the organization to deal with a specific disaster;
- Establishment of an early detection system for the disasters;
- Development of a reliable instant information/communication systems and Organization and mobilization of all the concerned departments/organizations/groups and agencies instantly when needed.

## **Objective of Disaster Management Plan**

The objective of Disaster Management plan is to give a broad framed layout to tackle emergency situation that may lead to a hazardous situation. It defines detail organizational responsibilities, actions, reporting requirements, broad and specific key roles and responsibilities of personal with Organograms and organisation charts. The overall objectives of the emergency plan will be:

- Ensure safety of people, protect the environment
- To ensure localization of risk
- To minimize and reduce the effects of the accident on people and property.
- Immediate response to emergency scene with effective communication network and organized procedures
- To obtain and mitigate early warning of emergency conditions so as to prevent impact on personnel, assets and environment
- To prevent injuries by following proper onsite, offsite emergency plans that can protect personnel from the hazard

## **Phases of Disaster**

There are various phases of Disaster including pre and Post Management of Hazardous Event that may or has occurred.

### **a) Warning Phase**

Emergencies /disasters are generally preceded by warnings during which preventive measures may be initiated. For example uncontrollable build-up of pressure in process equipment, weather forecast give warning about formation of vapour cloud, equipment failure etc.

### Period of Impact Phase

This is the phase when emergency /disaster actually strike and preventive measures may hardly be taken. However, control measures to minimise the effects may be taken through a well-planned and ready-to-act disaster management plan already prepared by organization. The duration may be from seconds to days.

### **b) Rescue Phase**

This is the phase when impact is almost over and efforts are concentrated on rescue and relief measures.

### **c) Relief Phase**

In this phase, apart from organization and relief measures internally, depending on severity of the disaster, external help are also to be summoned to provide relief measures (like

evacuations to a safe place and providing medical help, food clothing etc.). This phase will continue till normalcy is restored.

#### **d) Rehabilitation Phase**

This is the final and longest phase. During which measures required to put the situation back to normal as far as possible are taken. Checking the systems, estimating the damages, repair of equipments and putting them again into service are taken up. Help from revenue/insurance authorities need to be obtained to assess the damage, quantum of compensation to be paid etc.

### **Key Elements**

#### **a) Basis of Plan**

Hazard Identification necessitates preparation and planning the prevention and methods by which accidental failure can be tackled without much damage to life. HAZID-HIRA and consequence analysis combines and requires planning for the following:

- Hazards from spread of fire or release of flammable from storage and process units
- Hazards due to formation of pressure waves due to vapour cloud explosion of flammable gases

#### **b) Emergency planning and Response procedure**

The Emergency Response Plan is plan for dealing with emergencies are implemented immediately whenever there is a fire, explosion, or release of a hazardous substance that threatens human health or the environment. The emergency response plan is reviewed and immediately amended whenever:

- The plan fails in an emergency
- The list of emergency contacts change
- The list of emergency equipment changes
- The facility changes in its design, construction, operation, maintenance, or other circumstances in a way that increases the potential for fire, explosions, or release of a hazardous substance

#### **c) Incident Response Plan**

It is the Frame work of addressing the emergency situation arose due to failure scenario.

- Incident Response Plan(IRP) and Emergency Preparedness Plan
- Incident Response Team (IRT)
- Emergency Response Team (ERT)
- Crisis Management Team (CMT)

## ON-SITE EMERGENCY PLAN

Disaster management plan are prepared with an aim of taking precautionary step to control the hazard propagation, avert disaster, take action after the disaster which limits the damage to the minimum and follow the on-site emergency planning.

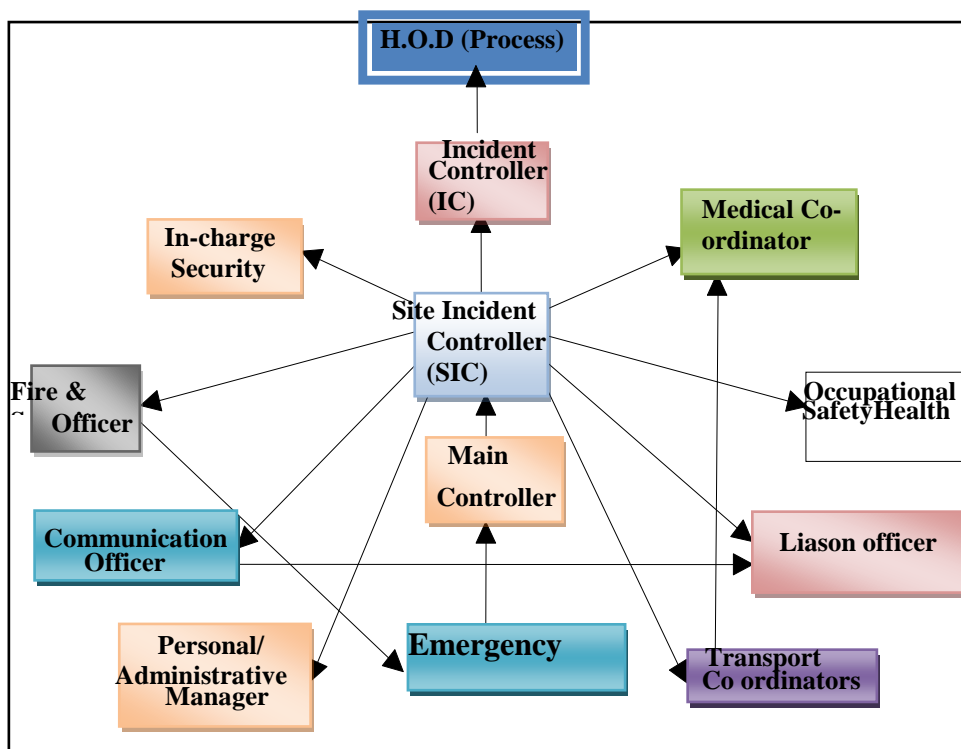
The onsite emergency is an unpleasant situation that causes extensive damage to plant personnel and surrounding area and its environment due to in operation, maintenance, design and human error. Onsite plan will be applied in case of proposed expansion. Following point are taken into consideration:

- To identify, assess, foresee and work out various kinds of possible hazards, their places, potential and damaging capacity and area in case of above happenings.
- Review, revise, redesign, replace or reconstruct the process, plant, vessels and control measures if so assessed.
- Measures to protect persons and property of processing equipment in case of all kinds of accidents, emergencies and disasters
- To inform people and surroundings about emergency if it is likely to adversely affect them

### Disaster control Management system at M/s. JCPL

Disaster Management group plays an important role in combating emergency in a systematic manner. Schematic representation Emergency Control Management system for M/s. JCPL is shown in **Figure**.

**Fig: Onsite DMP - Disaster Control / Management System**



## **Emergency Control Centre (ECC)**

An Emergency Control Centre (ECC) is established from which emergency operations are directed and co-ordinated. Centre will be activated as soon as on-site emergency is declared. The ECC will consist of one room, located in an area that offers minimal risk being directly exposed to possible accidents. During an emergency, the Emergency Management Staff, including the main controller will gather in the ECC. Therefore, the ECC will be equipped with adequate communication systems in the form of telephones and other equipment to allow unhampered organization and other nearby facility personnel.

The ECC will provide shelter to its occupants against the most common accidents; in addition, the ECC's communication systems will be protected from possible shutdown. The ECC will have its own emergency lighting arrangement and electric communication systems operation. The ECC will always be ready for operation and provided with the equipment and supplies necessary during the emergency such as:

- Hazard identification chart, All Emergency response plans
- Population around factory
- Internal telephone connections and External telephone connections
- A list of key personnel, with addresses, telephone numbers, etc.
- Hotline connection to district collector, police control room, fire brigade, Hospital etc.
- Public address system (PAS)
- MSDS of all the materials used in Plant site
- List of dispensaries and registered medical practitioners around factory
- Area map of surrounding villages
- Note pads and ball pens to record message received and instructions
- The blown up copy of Layout plan showing areas where accident has Occurred
- Undated copies of the On-site Disaster Management Plan
- Emergency telephone numbers
- The names, phone number, and address of external agencies, response organizations and neighbouring facilities
- The adequate number of telephone
- Emergency lights
- List of fire extinguishers with their type no. and location, capacity, etc
- Personal protective equipment(PPE)
- Safety helmets
- Clock
- Material safety data sheets for chemicals handled at the facility
- Several maps of the facility including drainage system for surrounding area showing:
  - Areas where hazardous materials are stored
  - Plant layout

- Plot plans of storage tanks, routes of pipelines, all water permanent lines etc.
- The locations where personal protective equipment are stored
- The position of pumping stations and other water sources
- Roads and plant entrances
- Assembly areas
- Lay out of Hydrant lines

### **Roles and Responsibility**

A team of following Essential persons shall be taking necessary action in case of emergency. The roles and responsibilities of these personnel are defined subsequently:

- Main Controller
- Site Incident Controller(SIC)
- Incident Controller (IC)
- Liaison Officer
- Communication Officer
- Observer
- In-charge (Security)
- In-charge (Medical)
- Shift In-charge (Security)

#### **a) Main Controller**

The Primary Controller is the employee who gives the first information about the incident/accident. He will be responsible for:

- To inform the Security office (Main Gate), & Engineers/Sr. Engineers / Shift In-Charges/HOD of Section of the aforesaid Department/Section from the nearest available telephone about the location and nature of incident.
- To assist rescue operation as well as clear obstruction, if any, in the same.
- To carry out all instructions from Incident Controller.

#### **b) Site Incident controller (SIC)**

The Unit Head shall have overall responsibility for the factory and its personnel. In absence of Unit Head, Chairman OHS Committee shall assume the responsibility of Site Controller. His duties during emergency shall be:

- To assess the magnitude of the situation and decide if employees need to be evacuated from assembly points.
- To give necessary instructions to Liaison Officer, HOD(HR&A) regarding the help to be obtained from outside agencies like Fire Brigade, Police and Medical

- To advise Liaison Officer to pass on necessary information about the incident to News Media and ensure that the evidences are preserved for enquiry to be conducted by statutory authorities.

#### **c) Incident Controller(IC)**

The HOD of affected department shall have overall responsibility for controlling the incident and directing the personnel. Section In charge of the affected department shall assume the responsibility of Incident Controller(IC) in the absence of HOD of affected department. His duties during emergency shall be:

- To inform Communication Officer about the emergency, Control Center& Assembly point.
- To direct all operations` within the affected area with priorities for safety of personnel, to minimize damage to the Plant and environment and to minimize loss of material.
- To act as Site Controller till the later arrives.
- To advise and provide information to Fire Squad, Security Officer and Local Fire Services when they arrive.
- To ensure that all non-essential persons are sent to the assembly point.

#### **d) Liaison Officer**

HOD (HR&A) shall be the Liaison officer. He shall be responsible for: -

- To contact Fire Brigade, Police, and Medical facilities on intimation from Site Controller & arrange for the rescue operation.
- To ensure that the casualties receive attention.
- To inform relatives of the affected employee at the earliest.
- To arrange for additional transport if required.
- To arrange for relief of personnel & organize refreshment/catering facility, in case the duration of emergency is prolonged.
- To issue authorized statements to news media and ensure that evidence is preserved for enquiry to be conducted.

#### **e) In-charge (Medical)**

On receiving the information he will reach hospital immediately and take following actions:

- He will keep necessary first aid medicines and artificial respiration equipment ready.
- Inform doctors at other places to be ready, for attending serious injury, burn cases and food poisoning

#### **f) Observer**



- During Mock Drill for Emergency Situations they shall be placed at different locations in plant to note down the movement and action taken by people and give feed back to the Site Controller.

#### **g) Communication Officer**

In-Charge (Safety) shall act as Communication officer. He shall work from Control Centre and maintain communication between relevant personnel. He shall be responsible for: -

- To apprise the site controller of the situation, based on the information received, suggest the evacuation of personnel from assembly points, if needed.
- To arrange for suitable persons to act as runners/messengers in case of failure of communication system.
- To carry out any other works as assigned by Site Controller/Incident Controller

#### **h) In-charge - Security**

- The In-charge (Security) shall guide the crew, according to the condition of emergency site, for the actions required to handle the emergency i.e. for fire-fighting, removal of debris, arresting of dust, removal of oil soaked earth etc. He shall give instructions to Security Guards to cordon off areas as required by Incident Controller. He shall render all help to incident controller to handle the emergency and carry out the work as assigned to him.
- He shall be responsible for ensuring the discipline at control points and for preventing the entry of unauthorized persons inside the affected area as well as inside the factory during emergency.

#### **i) Shift In-charge – Security**

He shall be responsible for

- To arrange the necessary help as requested by Primary Controller.
- To inform In-charge (Security).
- To blow emergency siren, if instructed by the HOD (HR&A)/Incident Controller.
- To send Ambulance near accident area.
- To rush to the accident site with fire brigade along with available trained security persons

#### **Automatic Fire Detection System**

Unattended vulnerable premises like electrical control rooms, cable tunnels, MCC, oil cellars, etc. will be provided with automatic fire detection and alarm systems.

#### **Manual Call Point Systems**

All major units and welfare/administrative building will be provide with manual call points for summoning the fire-fighting crew from the fire station for necessary assistance.

## **Fire Station**

The following equipment will be provided in the fire posts.

- Water tender
- Foam tender
- Portable pump
- Wireless set
- Hoses
- Hot line telephone

## **Alarm System**

A hooter installed at the Security Office shall be blown alternately with high and low pitch for 2 minutes to indicate major emergency in the plant. In such case, all non-essential employees are expected to gather at assembly point i.e. Company's Main Gate/Time Office. Signal for the clearance of emergency shall be given by blowing the hooter continuously for one minute.

## **First Aid**

- Fully equipped Hospital with Ambulance Van is available. Doctors and nurse are available round the clock to handle any emergency in the plant. The Ambulance shall be periodically checked through preventive maintenance programme .To ensure that the system is strictly followed, In-charge (Safety) shall cross check randomly once in a fortnight the preparedness of Ambulance as per the check list and counter sign
- The injured shall be shifted to nearby hospital, as per the opinion of the Medical Officer.
- A list of First Aid boxes is available in every department as mentioned in ECC
- Medical Officer shall ensure that refilling is done on monthly basis and he shall maintain a record of refilling.
- The names & contact numbers of trained First Aiders are provided the same is displayed at all the prominent locations in the premises.
- In case of Injury caused due to Hazardous Chemicals, Material Safety Data Sheet (MSDS) available with the user department / Hospital shall be referred.

## **Mock Drill**

For reviewing and assessing the level of preparedness, In-charge (Safety) shall conduct Mock trials twice in a year (one in each half) simulating the covered emergencies and will maintain records of the trials. The team of Prime & Deputy Responsible persons will review the records and events of the emergency preparedness trials along with the observations taken by the observer and report shall be put forward to the Site Controller. Corrective and Preventive measures, if suggested/directed, will be initiated and relevant records of the

same are maintained. Fire drills will be exercised once in every six months under the leadership of Incharge (Security). The records of Fire drill will be recorded & maintained.

The findings of the mock drills shall be used for improvements in preparedness and response. All team leaders shall be responsible for implementing the suggestions based on mock drill findings within reasonable time frame.

### **Training**

On yearly basis class room training for fire-fighting and mitigating measures to be adopted to reduce environmental impact & OHS risks, will be imparted covering at least 20% employee by the In-charge (Safety) and In-charge (Security). The records of the same are maintained.

### **Evacuation Plan**

To establish method of systematic, safe and orderly evacuation of all the occupants in case of fire or any emergency, in the least possible time, to a safe assembly point through nearest safe means of escape. Additionally to use available fire appliances provided for controlling or extinguishing fire and safeguarding of human life.

- Facility staff will be notified of evacuation by one or more of the following method(s): Verbal, Intercom, Portable Radio, Alarm, Other
- Notification to emergency services to ECC
- Staff will follow predetermined evacuation routes and assemble at designated areas. Evacuation maps must be displayed throughout the facility.
- Individuals responsible for coordinating evacuations must confirm the process

### **Assembly Point**

Assembly points depending upon the need and suitability will be identified wherein; employees who are not directly connected with the disaster management will be assembled for safety and rescue. Emergency breathing apparatus, minimum facilities like water etc. will be provided. Depending upon the location of hazard, the assembly points are to be used.

### **Emergency Power Supply**

Plant facilities will be connected to emergency power supply and will be placed in auto mode. Thus water pumps, plant lighting and emergency control center, administrative building and other auxiliary services will be connected to emergency power supply. In all the blocks flame proof type emergency lamps will be provided.

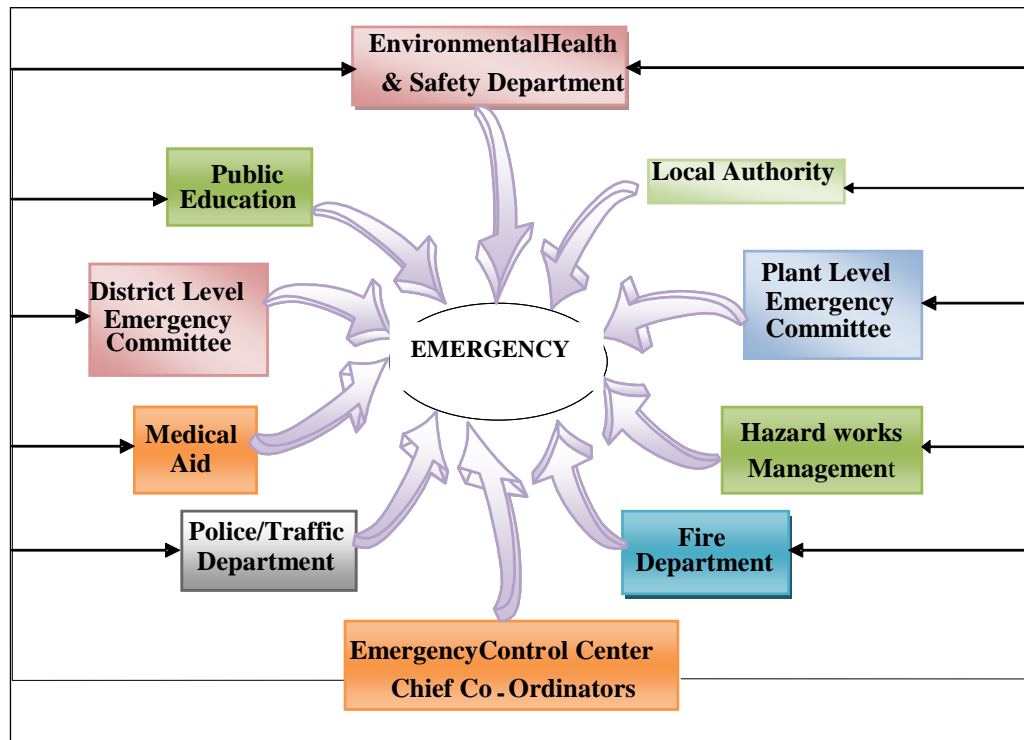
### **OFF-SITE EMERGENCY PLANNING**

The off-site emergency plan is an integral part of any hazard control system. It is based on those accidents identified by the works management, which could affect people and the

environment outside the works. Thus, the off-site plan follows logically from the analysis that took place to provide the basis for the on-site plan and the two plans therefore complement each other. The roles of the various parties that may be involved in the implementation of an off-site plan are described below. The responsibility for the off-site plan will be likely to rest either with the works management or with the local authority. Schematic representation of various organisation involved during emergency is shown below in **Fig.**

Either way, the plan must identify an emergency coordinating officer who would take overall command of the off-site activities. Consideration of evacuation may include the following factors:

- In the case of a major fire but without explosion risk (e.g. an oil storage tank), only houses close to the fire are likely to need evacuation
- If fire is escalating very fast it is necessary to evacuate people nearby as soon as possible
- In acute emergency people are advised to stay indoors and shield themselves from the fire.



**Fig: Various Organizations Involved During Emergency**

## Organization

Organizational details of command structure, warning systems, implementation procedures, emergency control centres include name and appointments of incident

controller, site main controller, their deputies and other key personnel involved during emergency.

### **Communications**

Identification of personnel involved, communication centre, call signs, network, list of telephone numbers.

### **Special Emergency Equipment**

Details of availability and location of heavy lifting gear, specified fire-fighting equipment, fireboats etc.

### **Voluntary Organizations**

Details of Voluntary organizations, telephone numbers nearby of hospitals, Emergency helpline, resources etc are to be available with chief authorities.

### **Non-governmental Organizations (NGO)**

NGO's could provide a valuable source of expertise and information to support emergency response efforts. Members of NGOs could assist response personnel by performing specified tasks, as planned during the emergency planning process.

- Evacuation of personnel from the affected area
- Arrangements at rallying posts and parking yards
- Rehabilitation of evacuated persons

### **Chemical information**

Details of the hazardous substances (MSDS information) and a summary of the risks associated with them will be made available at respective site.

### **Meteorological information**

There is to be arrangements for obtaining details of weather conditions prevailing at r before the time of accident and weather forecasts updates.

### **Humanitarian Arrangements**

Transport, evacuation centres, emergency feeding, treatment of injured, first aid, ambulances, temporary mortuaries.

### **Public Information**

- Dealing with the media-press office
- Informing relatives, etc.

### **Assessment**

- Collecting information on the causes of the emergency

- Reviewing the efficiency and effectiveness of all aspects of the emergency plan.

### **Role of local authority**

Local Authorities like Panchayat, Sabha, Samity, municipalities can help in combating emergency situation after assessing the impact scenario in rescue phase.

### **Role of police**

The police are to assist in controlling of the accident site, organizing evacuation and removing of any seriously injured people to hospitals.

- Co-ordination with the transport authorities, civil defence and home guards
- Co-ordination with army, navy, air force and state fire services
- Arrange for post mortem of dead bodies
- Establish communication centre with easy contact with ECC

### **Role of Fire Brigade**

The fire brigade shall be organized to put out fires and provide assistance as required during emergency.

### **Media**

- The media is to have ready and continuous access to designated officials with relevant information, as well as to other sources in order to provide essential and accurate information to public throughout the emergency and to avoid commotion and confusion
- Efforts are made to check the clarity and reliability of information as it becomes available, and before it is communicated to public
- Public health authorities are consulted when issuing statements to the media concerning health aspects of chemical accidents
- Members of the media are to facilitate response efforts by providing means for informing the public with credible information about accidents involving hazardous substances.

### **Role of health care authorities**

- Hospitals and doctors shall be ready to treat all type of injuries to casualties during emergency.
- Co-ordinate the activities of Primary Health Centres and Municipal Dispensaries to ensure required quantities of drugs and equipments
- Securing assistance of medical and paramedical personnel from nearby hospitals/institutions
- Temporary mortuary and identification of dead bodies.